

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Jun KOTANI, et al.

Appln. No.: Continuation of USAN 09/584,075

Group Art Unit: 1712 (parent)

Confirmation No.: Not yet designated

Examiner: K. PENG (parent)

Filed: December 10, 2001

December 10, 2001

For: CURABLE RESIN COMPOSITION

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination, please amend the above-identified application as follows:

IN THE SPECIFICATION:

The specification is changed as follows:

Amend the specification by inserting before the first line the sentence:

This is a Continuation of Application No. 09/584,075, filed June 1, 2000, the disclosure of which is incorporated herein by reference.

IN THE CLAIMS:

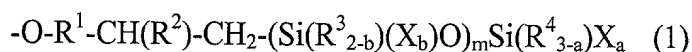
Claims 1-8 are canceled.

Claims 9-20 are added as new claims.

9. A curable resin composition

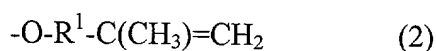
which comprises (I) a reactive silicon group-containing polyether oligomer, (II) a copolymer comprising a molecular chain substantially composed of one or more acrylate ester monomer units and/or methacrylate ester monomer units and (III) an accelerator,

said reactive silicon group-containing polyether oligomer having, within the molecule thereof, a partial structure represented by the general formula (1):



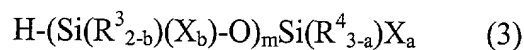
wherein R^1 represents a divalent organic group of 1 to 20 carbon atoms containing at least one constituent element selected from the group consisting of hydrogen, oxygen and nitrogen, R^2 represents an alkyl group of 1 to 10 carbon atoms, R^3 and R^4 may be the same or different and each represents an alkyl group of 1 to 20 carbon atoms, an aryl group of 6 to 20 carbon atoms or an aralkyl group of 7 to 20 carbon atoms or a triorganosiloxy group of the formula $(R')_3SiO-$, in which R' is a monovalent hydrocarbon group of 1 to 20 carbon atoms and the three R' groups may be the same or different, and where there are two or more R^3 or R^4 groups, they may be the same or different; X represents a hydroxyl group or a hydrolyzable group and, where there are two or more X groups, they may be the same or different; a represents 0, 1, 2 or 3, b represents 0, 1 or 2, m represents an integer of 0 to 19, and the b 's in the $m-(Si(R^{3_{2-b}})(X_b)-O)-$ groups may be the same or different, provided that the condition $a + \sum b \geq 1$ is satisfied;

wherein said component (I) is obtained by reacting a polyether oligomer having an unsaturated bond introduced therein of the general formula (2):



wherein R^1 is as defined above,

with a reactive silicon group-containing compound represented by the general formula (3):



wherein R^3 , R^4 , a , b , m and X are as defined above,

in an oxygen-containing atmosphere in the presence of a catalyst and a sulfur compound selected from among thiols, sulfides, sulfoxides, sulfones and thioketones.

10. The curable resin composition according to Claim 9,

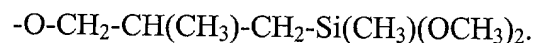
wherein R^1 in component (I) is CH_2 .

11. The curable resin composition according to Claim 9,

wherein R^2 in component (I) is CH_3 .

12. The curable resin composition according to Claim 9,

wherein component (I) is a reactive silicon group-containing polyether oligomer having a partial structure represented by the formula:



13. The curable composition according to Claim 9,

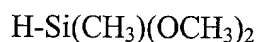
wherein component (I) is a reactive silicon group-containing polyether oligomer having a partial structure represented by the formula:



as obtained by reacting a polyether oligomer having an unsaturated bond introduced therein of the formula:



with a reactive silicon group-containing compound of the formula:



in an oxygen-containing atmosphere in the presence of a catalyst and a sulfur compound selected from among thiols, sulfides, sulfoxides, sulfones and thioketones.

14. The curable resin composition according to Claim 9,

wherein component (II) is a copolymer comprising a molecular chain substantially composed of (a) acrylic and/or methacrylic ester monomer units having a hydrocarbon group of 1 to 8 carbon atoms, and (b) acrylic and/or methacrylic ester monomer units having a hydrocarbon group of 10 or more carbon atoms.

15. The curable resin composition according to Claim 9,

wherein component (II) is a copolymer having a silicon group crosslinkable under siloxane bond formation.

16. The curable composition according to Claim 9,

wherein an addition amount of the sulfur compound is within the range of 0.1 to 10 moles per mole of a metal catalyst or of 0.002 to 0.1 mole per mole of an alkenyl group, or of 1 to 500 ppm on a whole reaction mixture weight basis.

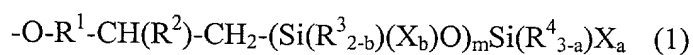
17. The curable resin composition according to Claim 9,

wherein an oxygen concentration in a gaseous phase in a reactor is 0.5 to 10%.

18. A method of adhesion of an adherend, which comprises applying a curable resin composition to said adherend, allowed to stand in the air to develop tack in the adhesive layer, and conducting adhesion of said adherends during the tack is retained in the adhesive layer,

wherein said curable resin composition comprises (I) a reactive silicon group-containing polyether oligomer, (II) a copolymer comprising a molecular chain substantially composed of one or more acrylate ester monomer units and/or methacrylate ester monomer units and (III) an accelerator,

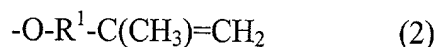
said reactive silicon group-containing polyether oligomer having, within the molecule thereof, a partial structure represented by the general formula (1):



wherein R^1 represents a divalent organic group of 1 to 20 carbon atoms containing at least one constituent element selected from the group consisting of hydrogen, oxygen and nitrogen, R^2 represents an alkyl group of 1 to 10 carbon atoms, R^3 and R^4 may be the same or different and each represents an alkyl group of 1 to 20 carbon atoms, an aryl group of 6 to 20 carbon atoms or

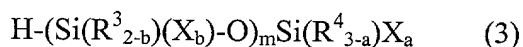
an aralkyl group of 7 to 20 carbon atoms or a triorganosiloxy group of the formula $(R')_3SiO-$, in which R' is a monovalent hydrocarbon group of 1 to 20 carbon atoms and the three R' groups may be the same or different, and where there are two or more R^3 or R^4 groups, they may be the same or different; X represents a hydroxyl group or a hydrolyzable group and, where there are two or more X groups, they may be the same or different; a represents 0, 1, 2 or 3, b represents 0, 1 or 2, m represents an integer of 0 to 19, and the b 's in the m $-(Si(R^{3-2-b})(X_b)-O)-$ groups may be the same or different, provided that the condition $a + \sum b \geq 1$ is satisfied;

wherein said component (I) is obtained by reacting a polyether oligomer having an unsaturated bond introduced therein of the general formula (2):



wherein R^1 is as defined above,

with a reactive silicon group-containing compound represented by the general formula (3):



wherein R^3 , R^4 , a , b , m and X are as defined above,

in an oxygen-containing atmosphere in the presence of a catalyst and a sulfur compound selected from among thiols, sulfides, sulfoxides, sulfones and thioketones.

19. The method of adhesion according to Claim 18,

wherein an addition amount of the sulfur compound is within the range of 0.1 to 10 moles per mole of a metal catalyst or of 0.002 to 0.1 mole per mole of an alkenyl group, or of 1 to 500 ppm on a whole reaction mixture weight basis.

20. The method of adhesion according to Claim 18,

wherein an oxygen concentration in a gaseous phase in a reactor is 0.5 to 10%.


REMARKS

The claims have been amended to by the cancellation of the original claims 1-8 and the addition of new claims 9-20, to place the claims in desired appropriate form for examination. Thus the claims are presently in appropriate form, and the Examiner is respectfully requested to proceed with the examination.

Early favorable action is earnestly solicited.

In the event that the Examiner believes that it may facilitate the further prosecution of this application, the Examiner is invited to contact the undersigned attorney at the local Washington, D.C. telephone number indicated below.

Respectfully submitted,


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Facsimile: (202) 293-7860

Date: December 10, 2001

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The specification is changed as follows:

Amend the specification by inserting before the first line the sentence:

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IN THE CLAIMS:

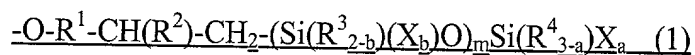
Claims 1-8 are canceled.

Claims 9-20 are added as new claims.

9. A curable resin composition

which comprises (I) a reactive silicon group-containing polyether oligomer, (II) a copolymer comprising a molecular chain substantially composed of one or more acrylate ester monomer units and/or methacrylate ester monomer units and (III) an accelerator,

said reactive silicon group-containing polyether oligomer having, within the molecule thereof, a partial structure represented by the general formula (1):



wherein R¹ represents a divalent organic group of 1 to 20 carbon atoms containing at least one constituent element selected from the group consisting of hydrogen, oxygen and nitrogen, R² represents an alkyl group of 1 to 10 carbon atoms, R³ and R⁴ may be the same or different and each represents an alkyl group of 1 to 20 carbon atoms, an aryl group of 6 to 20 carbon atoms or

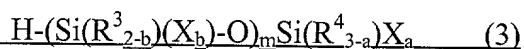
an aralkyl group of 7 to 20 carbon atoms or a triorganosiloxy group of the formula (R')₃SiO-, in which R' is a monovalent hydrocarbon group of 1 to 20 carbon atoms and the three R' groups may be the same or different, and where there are two or more R³ or R⁴ groups, they may be the same or different; X represents a hydroxyl group or a hydrolyzable group and, where there are two or more X groups, they may be the same or different; a represents 0, 1, 2 or 3, b represents 0, 1 or 2, m represents an integer of 0 to 19, and the b's in the m -(Si(R³_{2-b})(X_b)-O)- groups may be the same or different, provided that the condition a + Σb > 1 is satisfied;

wherein said component (I) is obtained by reacting a polyether oligomer having an unsaturated bond introduced therein of the general formula (2):



wherein R¹ is as defined above,

with a reactive silicon group-containing compound represented by the general formula (3):



wherein R³, R⁴, a, b, m and X are as defined above,

in an oxygen-containing atmosphere in the presence of a catalyst and a sulfur compound selected from among thiols, sulfides, sulfoxides, sulfones and thioketones.

10. The curable resin composition according to Claim 9,

wherein R¹ in component (I) is CH₂.

11. The curable resin composition according to Claim 9,

wherein R² in component (I) is CH₃.

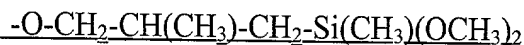
12. The curable resin composition according to Claim 9,

wherein component (I) is a reactive silicon group-containing polyether oligomer having a partial structure represented by the formula:

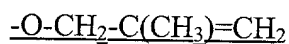


13. The curable composition according to Claim 9,

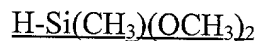
wherein component (I) is a reactive silicon group-containing polyether oligomer having a partial structure represented by the formula:



as obtained by reacting a polyether oligomer having an unsaturated bond introduced therein of the formula:



with a reactive silicon group-containing compound of the formula:



in an oxygen-containing atmosphere in the presence of a catalyst and a sulfur compound selected from among thiols, sulfides, sulfoxides, sulfones and thioketones.

14. The curable resin composition according to Claim 9,

wherein component (II) is a copolymer comprising a molecular chain substantially composed of (a) acrylic and/or methacrylic ester monomer units having a hydrocarbon group of 1 to 8 carbon atoms, and (b) acrylic and/or methacrylic ester monomer units having a hydrocarbon group of 10 or more carbon atoms.

15. The curable resin composition according to Claim 9,

wherein component (II) is a copolymer having a silicon group crosslinkable under siloxane bond formation.

16. The curable composition according to Claim 9,

wherein an addition amount of the sulfur compound is within the range of 0.1 to 10 moles per mole of a metal catalyst or of 0.002 to 0.1 mole per mole of an alkenyl group, or of 1 to 500 ppm on a whole reaction mixture weight basis.

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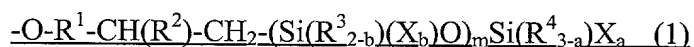
wherein an oxygen concentration in a gaseous phase in a reactor is 0.5 to 10%.

18. A method of adhesion of an adherend, which comprises applying a curable resin composition to said adherend, allowed to stand in the air to develop tack in the adhesive

layer, and conducting adhesion of said adherends during the tack is retained in the adhesive layer,

wherein said curable resin composition comprises (I) a reactive silicon group-containing polyether oligomer, (II) a copolymer comprising a molecular chain substantially composed of one or more acrylate ester monomer units and/or methacrylate ester monomer units and (III) an accelerator,

said reactive silicon group-containing polyether oligomer having, within the molecule thereof, a partial structure represented by the general formula (1):



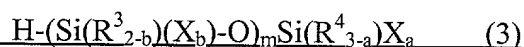
wherein R¹ represents a divalent organic group of 1 to 20 carbon atoms containing at least one constituent element selected from the group consisting of hydrogen, oxygen and nitrogen, R² represents an alkyl group of 1 to 10 carbon atoms, R³ and R⁴ may be the same or different and each represents an alkyl group of 1 to 20 carbon atoms, an aryl group of 6 to 20 carbon atoms or an aralkyl group of 7 to 20 carbon atoms or a triorganosiloxy group of the formula (R')₃SiO-, in which R' is a monovalent hydrocarbon group of 1 to 20 carbon atoms and the three R' groups may be the same or different, and where there are two or more R³ or R⁴ groups, they may be the same or different; X represents a hydroxyl group or a hydrolyzable group and, where there are two or more X groups, they may be the same or different; a represents 0, 1, 2 or 3, b represents 0, 1 or 2, m represents an integer of 0 to 19, and the b's in the m -(Si(R³_{2-b})(X_b)-O)- groups may be the same or different, provided that the condition a + Σb > 1 is satisfied;

wherein said component (I) is obtained by reacting a polyether oligomer having an unsaturated bond introduced therein of the general formula (2):



wherein R¹ is as defined above,

with a reactive silicon group-containing compound represented by the general formula (3):



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in an oxygen-containing atmosphere in the presence of a catalyst and a sulfur compound selected from among thiols, sulfides, sulfoxides, sulfones and thioketones.

19. The method of adhesion according to Claim 18,

wherein an addition amount of the sulfur compound is within the range of 0.1 to 10 moles per mole of a metal catalyst or of 0.002 to 0.1 mole per mole of an alkenyl group, or of 1 to 500 ppm on a whole reaction mixture weight basis.

20. The method of adhesion according to Claim 18,

wherein an oxygen concentration in a gaseous phase in a reactor is 0.5 to 10%.